RECEIVED
CENTRAL FAX CENTER
JUN 22 2007

Amendments to the Claims: This listing of claims will replace all prior versions, and listings, of claims in the application

Listing of Claims:

1. (Original) A method for generating wideband signals for transmitting source data, the wideband signals including wideband signal pulses and having reduced discrete power spectral density (PSD) components, the method comprising the steps of:

pulse modulating the source data;

repeating and time hopping pulses within the pulse modulated source data;

selectively inverting the polarity of the repeated and time hopped pulses; and

modulating the wideband signal pulses with the selectively inverted pulses.

2. (Original) The method of claim 1, wherein the pulse modulating step comprises the step of modulating the source data using at least one of (1) a pulse position modulation scheme and (2) a pulse amplitude modulation scheme.

3. (Original) The method of claim 1, wherein the selectively inverting step comprises the step of:

selectively inverting the polarity of the repeated and time hopped pulses responsive to a pseudo random number sequence.

4. (Original) An apparatus for generating wideband signals for transmitting source data, the wideband signals including wideband signal pulses and having reduced discrete power spectral density (PSD) components, the apparatus comprising:

a modulator that pulse modulates the source data;

a repeater coupled to the modulator, the repeater configured to repeat and time hop pulses within the pulse modulated source data;

an inverter coupled to the repeater, the inverter configured to selectively invert the polarity of the repeated and time hopped pulses; and

a pulse shaping circuit coupled to the inverter, the pulse shaping circuit configured to modulate the wideband pulses with the selectively inverted pulses for transmission.

5. (Original) The apparatus of claim 4, wherein the modulator is configured to modulate the source data using at least one of (1) a pulse position modulation scheme and (2) a pulse amplitude modulation scheme.

6. (Original) The apparatus of claim 4, wherein the pulse shaping circuit is an ultra wideband (UWB) pulse shaping circuit.

7. (Original) A method for processing a wideband signal carrying a data signal having randomly inverted pulses, the randomly inverted pulses generated from source data that is pulse modulated, repeated, and time hopped, the method comprising the steps of:

receiving the data signal carried by the wideband signal;

sampling the received data signal at time hopped positions;

selectively inverting the pulses within the received data signal;

summing corresponding repeated pulses within the received data signal after sampling and inverting; and

deriving the source data from the summed pulses.

8. (Original) The method of claim 7, wherein the source data is pulse position modulated (PPM) using at least two pulse positions in a symbol and each pulse is repeated and time hopped at least once to create corresponding pulses, each corresponding pulse having a corresponding relative pulse position in the symbol, and wherein the method further comprises the step of:

creating an intermediate pulse stream for each pulse position sampled at the time hopped positions;

wherein the summing step comprises the step of summing the pulses within each intermediate pulse stream for corresponding pulses; and

wherein the deriving step comprises the step of demodulating the wideband signal responsive the maximum summed value for corresponding pulses within each intermediate pulse stream.

9. (Original) The method of claim 7, wherein the deriving step comprises the step of:

demodulating the summed pulses using a phase amplitude modulation (PAM) scheme.

10. (Currently Amended) An apparatus for processing a wideband signal having randomly inverted pulses, the randomly inverted pulses generated from source data that is pulse modulated, repeated, and time hopped, the apparatus comprising:

a filter configured to receive and discriminate the wideband signal having randomly inverted pulses;

an inverted coupled to the filter, the inverter configured to selectively invert the randomly inverted pulses to remove the random inversion;

a summing circuit coupled to the inverter, the summing circuit configured to sum corresponding repeated pulses; and

a demodulator coupled to the summing ~~circuits~~circuit, the demodulator configured to demodulate the summed corresponding repeated pulses to derive the source data.

11. (Original) The apparatus of claim 10, wherein the filter is a matched filter for detecting an ultra wideband (UWB) pulse.

12. (Original) The apparatus of claim 10, wherein the demodulator is a pulse demodulator that is configured to demodulate the data using at least one of (1) a pulse position demodulation scheme and (2) a pulse amplitude demodulation scheme.

13. (Currently Amended) A receiving method for use with a wideband signal having randomly inverted pulses, the method comprising the steps of:

receiving the wideband signal; and

applying a function to map pulses of either polarity within the wideband signal to a single polarity to produce a pulse stream in which all pulses have the same polarity, the

function comprising squaring the pulses of either polarity within the wideband signal to produce the pulse stream.

14. (Canceled)

15. (Original) The method of claim 13, wherein the step of applying a function comprises the step of:

producing a corresponding pulse for each pulse, each pulse and corresponding pulse having the same polarity; and

multiplying each pulse by its corresponding pulse.

16. (Original) The method of claim 13, wherein the step of applying a function comprises the step of:

removing sign information from the pulses of either polarity.

17. (Original) The method of claim 13 , wherein the wideband signal includes source data that is pulse position modulated (PPM) using at least two pulse positions in a symbol and each pulse is repeated and time hopped at least once to create corresponding pulses, each corresponding pulse having a corresponding relative pulse position in the symbol and wherein the step of applying a function comprises the step of:

applying the following function:

$$\sum_{l=0}^{R-1}\log(\cosh(Y_{(l,0)}\frac{S}{\sigma^2})) > \sum_{l=0}^{R-1}\log(\cosh(Y_{(l,1)}\frac{S}{\sigma^2})) \Rightarrow Ho$$

;

otherwise H1;

where Y is a single pulse before summation, S is the expected amplitude of the single pulse if received, σ^2 is the variance of white noise for each sample, R is a number of time hopped positions, Ho indicates that the received pulse has a first index value, and H1 indicates that the received pulse has a second index value.

18. (Original) The method of claim 13, wherein the wideband signal is pulse position modulated (PPM) and wherein the method further comprises the step of:

demodulating the wideband signal using a PPM demodulation scheme.

19. (Original) The method of claim 13, wherein the wideband signal includes source data that is pulse position modulated (PPM) using at least two pulse positions in a symbol and each pulse is repeated and time hopped at least once to create corresponding pulses, each corresponding pulse having a corresponding relative pulse position in the symbol, and wherein the method further comprises the steps of:

creating an intermediate pulse stream for each pulse position sampled at the time hopped positions;

summing the pulses within each intermediate pulse stream after applying the function; and

demodulating the wideband signal responsive the maximum summed pulses within each intermediate pulse stream.

20. (Original) A receiving apparatus for processing a wideband signal having randomly inverted pulses having either a first polarity or a second polarity opposite the first polarity, the apparatus comprising:

a filter configured to receive and discriminate the wideband signal having randomly inverted pulses; and

a function circuit coupled to the filter, the function circuit configured to map pulses of either polarity within the wideband signal to a single polarity to produce a pulse stream in which all pulses have the same polarity.

21. (Original) The apparatus of claim 20, wherein the filter is a matched filter for detecting ultra wideband (UWB) pulses.

22. (Original) The apparatus of claim 20, wherein the function circuit is configured to square the pulses of either polarity within the wideband signal to produce the pulse stream.

23. (Original) The apparatus of claim 20, wherein the function circuit is configured to produce a corresponding pulse for each pulse, each pulse and corresponding pulse having the same polarity, and multiply each pulse by its corresponding pulse.

24. (Original) The method of claim 20, wherein the function circuit is configured to remove sign information from the pulses of either polarity.

25. (Original) The method of claim 20, wherein the wideband signal includes source data that is pulse position modulated (PPM) using at least two pulse positions in a symbol and each pulse is repeated and time hopped at least once to create corresponding pulses, each corresponding pulse having a corresponding relative pulse position in the symbol and wherein the function circuit is configured to apply the following function:

$$\sum_{l=0}^{R-1} \log(\cosh(Y_{(l,0)} \frac{S}{\sigma^2})) > \sum_{l=0}^{R-1} \log(\cosh(Y_{(l,1)} \frac{S}{\sigma^2})) \Rightarrow Ho \quad ;$$

otherwise H1;

where Y is a single pulse before summation, S is the expected amplitude of the single pulse if received, σ^2 is the variance of white noise for each sample, R is a number of time hopped positions, Ho indicates that the received pulse has a first index value, and H1 indicates that the received pulse has a second index value.

26. (Original) The apparatus of claim 20, wherein the wideband signal is pulse position modulated (PPM) and wherein the apparatus further comprises:

a demodulator that demodulates the wideband signal using a PPM demodulation scheme.

27. (Original) The apparatus of claim 20, wherein the wideband signal includes source data that is pulse position modulated (PPM) using at least two pulse positions in a symbol and each pulse is repeated and time hopped at least once to create corresponding pulses, each of the corresponding pulses having a corresponding relative pulse position in the symbol, and wherein the apparatus further comprises:

a delay circuit coupled to the function circuit, the delay circuit configured to create an intermediate pulse stream for each pulse position that is sampled at time hopped positions;

a summing circuit coupled to the function circuit that sums the corresponding pulses within each intermediate pulse stream after the function circuit maps the pulses to a single polarity; and

a comparator coupled to the summing circuit that demodulates the pulse position modulated wideband signal responsive a maximum summed pulse value within each summed intermediate pulse stream.